

## CLAIMS

We Claim:

- 1           1. A method for performing calibration for testing of a device under test,  
2   the method comprising:  
3           connecting a first port of the device under test to a port of a calibration  
4   module;  
5           connecting a second port of the device under test to a first port of a device  
6   tester;  
7           connecting a third port of the device under test to a second port of a  
8   device tester; and,  
9           performing measurements by the device tester to obtain calibration  
10   parameters, including:  
11           changing, by the calibration module, termination values at the port  
12   of the calibration module in response to commands from the device tester, the  
13   changing of the termination values being performed without physical  
14   disconnection of the port of the calibration module from the first port of the  
15   device under test.
- 1           2. A method as in claim 1 additionally comprising:  
2           performing a one-port calibration of the first port of the device tester;  
3   and,  
4           performing a one-port calibration of the second port of the device tester.

1           3. A method as in claim 1 wherein:  
2           the device under test is a power splitter;  
3           the first port of the device under test is an input port of the power splitter;  
4    and,  
5           the second port and the third port of the device under test are output ports  
6    of the power splitter.

1           4. A method as in claim 1 wherein the device under test is one of the  
2    following:  
3           a power splitter;  
4           a directional coupler.

1           5. A method as in claim 1 wherein:  
2           the device under test is a directional coupler;  
3           the first port of the device under test is an output port of the directional  
4    coupler; and,  
5           the second port and the third port of the device under test are coupled  
6    ports of the directional coupler.

1           6. A method as in claim 1 wherein the calibration parameters are three-  
2    port S-parameters:

1           7. A method as in claim 1 wherein the calibration parameters are the  
2 following three-port S-parameters:

3            $S_{11}$  representing a reflective signal from the first port of the device under  
4 test to the first port of the device under test;

5            $S_{21}$  representing the transmission signal from the first port of the device  
6 under test to the second port of the device under test;

7            $S_{31}$  representing the transmission signal from the first port of the device  
8 under test to the third port of the device under test;

9            $S_{12}$  representing the transmission signal from the second port of the  
10 device under test to the first port of the device under test;

11            $S_{22}$  representing the reflective signal from the second port of the device  
12 under test to the second port of the device under test;

13            $S_{32}$  representing the transmission signal from the second port of the  
14 device under test to the third port of the device under test;

15            $S_{13}$  representing the transmission signal from the third port of the device  
16 under test to the first port of the device under test;

17            $S_{23}$  representing the transmission signal from the third port of the device  
18 under test to the second port of the device under test; and,

19            $S_{33}$  representing the reflective signal from the third port of the device  
20 under test to the third port of the device under test;

21           wherein  $S_{21} = S_{12}$ ,  $S_{13} = S_{31}$ , and  $S_{23} = S_{32}$ .

1           8. A method as in claim 1 wherein the device tester is a network analyzer.

1           9. A device tester that tests a device under test, the device tester

2   comprising:

3           a first port;

4           a second port; and,

5           a communication port;

6           wherein the device tester communicates to a calibration module through

7   the communication port, instructing the calibration module to change

8   termination values at a port of the calibration module without physical

9   disconnection of the port of the calibration module from a first port of the

10   device under test, the instructing being given during testing of the device under

11   test when a second port of the device under test is connected to the first port of

12   the device tester, when a third port of the device under test is connected to the

13   second port of the device tester, and when the device tester is obtaining

14   calibration parameters for the device under test.

1           10. A device tester as in claim 9 wherein the device under test is a power

2   splitter.

1           11. A device tester as in claim 9 wherein:

2           the device under test is a power splitter;

3           the first port of the device under test is an input port of the power splitter;

4   and,

5           the second port and the third port of the device under test are output ports  
6   of the power splitter.

1           12. A device tester as in claim 9 wherein the device under test is a  
2   directional coupler.

1           13. A device tester as in claim 9 wherein:  
2           the device under test is a directional coupler;  
3           the first port of the device under test is an output port of the directional  
4   coupler; and,  
5           the second port and the third port of the device under test are coupled  
6   ports of the directional coupler.

1           14. A device tester as in claim 9 wherein the calibration parameters are  
2   three-port S-parameters.

1           15. A device tester as in claim 9 wherein the calibration parameters are  
2   the following three-port S-parameters:  
3            $S_{11}$  representing a reflective signal from the first port of the device under  
4   test to the first port of the device under test;  
5            $S_{21}$  representing the transmission signal from the first port of the device  
6   under test to the second port of the device under test;

7            $S_{31}$  representing the transmission signal from the first port of the device  
8 under test to the third port of the device under test;

9            $S_{12}$  representing the transmission signal from the second port of the  
10 device under test to the first port of the device under test;

11            $S_{22}$  representing the reflective signal from the second port of the device  
12 under test to the second port of the device under test;

13            $S_{32}$  representing the transmission signal from the second port of the  
14 device under test to the third port of the device under test;

15            $S_{13}$  representing the transmission signal from the third port of the device  
16 under test to the first port of the device under test;

17            $S_{23}$  representing the transmission signal from the third port of the device  
18 under test to the second port of the device under test; and,

19            $S_{33}$  representing the reflective signal from the third port of the device  
20 under test to the third port of the device under test;

21           wherein  $S_{21} = S_{12}$ ,  $S_{13} = S_{31}$ , and  $S_{23} = S_{32}$ .

1           16. A device tester that tests a device under test, the device tester  
2 comprising:

3           a communication port means for communicating to a calibration module  
4 in order to instruct the calibration module to change termination values at a  
5 port of the calibration module without physically disconnecting the port of the  
6 calibration module from a first port of the device under test;

7 a first port means for connecting to a second port of the device under test;

8 and,

9 a second port means for connecting to a third port of the device under  
10 test;

11 wherein the device tester obtains calibration parameters for the device  
12 under test.

1 17. A device tester as in claim 16 wherein the calibration parameters are  
2 three-port S-parameters:

1 18. A device tester as in claim 16 wherein:

2 the device under test is a power splitter;

3 the first port of the device under test is an input port of the power splitter;

4 and,

5 the second port and the third port of the device under test are output ports  
6 of the power splitter.

1 19. A device tester as in claim 16 wherein:

2 the device under test is a directional coupler;

3 the first port of the device under test is an output port of the directional  
4 coupler; and,

5 the second port and the third port of the device under test are coupled  
6 ports of the directional coupler.

1           20. A device tester as in claim 16 wherein the calibration parameters are  
2 the following three-port S-parameters:

3            $S_{11}$  representing a reflective signal from the first port of the device under  
4 test to the first port of the device under test;

5            $S_{21}$  representing the transmission signal from the first port of the device  
6 under test to the second port of the device under test;

7            $S_{31}$  representing the transmission signal from the third port of the device  
8 under test to the first port of the device under test;

9            $S_{12}$  representing the transmission signal from the second port of the  
10 device under test to the first port of the device under test;

11           $S_{22}$  representing the reflective signal from the second port of the device  
12 under test to the second port of the device under test;

13           $S_{32}$  representing the transmission signal from the second port of the  
14 device under test to the third port of the device under test;

15           $S_{13}$  representing the transmission signal from the third port of the device  
16 under test to the first port of the device under test;

17           $S_{23}$  representing the transmission signal from the third port of the device  
18 under test to the second port of the device under test; and,

19           $S_{33}$  representing the reflective signal from the third port of the device  
20 under test to the third port of the device under test;

21          wherein  $S_{21} = S_{12}$ ,  $S_{13} = S_{31}$ , and  $S_{23} = S_{32}$ .